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THE PSYCHOLOGY OF THE LEARNING PROCESS

PROBABLY no one to-day hopes to invent a machine which will have perpetual motion, and yet many inventors are striving towards an approximation to such a marvel and are constantly reducing friction and making machinery more useful. Likewise, no one can hope to lay down rules which will insure that every child will learn what it is thought he should learn, and yet such an ideal helps us on the way towards formulating such pedagogical principles as will render our system of educational machinery more regular and efficient in its output. And so I am attempting in these few pages to block out in a rough way the psychology of the learning process. With this problem in mind for years in a more or less definite way, I have been introspecting my own mental condition when trying to learn, I have been observing children in the greatest age of 'free learning,' from four to six, and I have also observed adults and experimented somewhat with them in laboratories and class-rooms.

Starting with some notions gained, perhaps, from the Herbartian pedagogy and psychology, it seems to me there are three things, or perhaps four things, which must be taken into account concerning consciousness when learning is taking place in the best way. They are (1) the attitude of the mind, (2) the contents of consciousness, (3) the form of the contents of consciousness, and (4) the structure of consciousness.

Popularly speaking, the proper attitude of mind for learning is that of inquiry, what Professor Baldwin so recently has called 'proposal,' in his article on 'Thought and Language.' When you are engaged in free learning or the pursuit of truth, is it not so that you first set yourself a problem or question? Are you not best satisfied with your pupils when they are asking questions? 'Students are known by the questions they ask,' is an aphorism which my students attribute to me. Of course, I need not remind you that a child from two to six is a wriggling mass of interrogation points. And what is the attitude of inquiry? It is that attitude of the mind when certain ideas are ready to receive new ideas of a related nature, or to form

new associations. We generally describe the state by calling it the state of attention, and in particular the state of free learning seems to be that of interested attention or, briefly, interest. A certain train of ideas predominates over other ideas, which requires further associations in order to complete itself. The 'what' or 'why' of a question denotes a gap in a train of thought to be filled, and the person who has the most gaps can naturally take the most in, can learn the most. A very pronounced state of inquiry may be distressing, morbid, dangerous, in some cases, but do we not also designate it as 'divine discontent' in others?

The state of mind in which we are not going to learn much of anything is that of indifference, where our ideas flow along without a break or a ripple on the surface, and if it is not one idea, then it is another which slips into the stream, and no definite end or conclusion is reached because there is no end in view, no gap to be filled.

The content of the mind also determines the success of the learning process. There are certain ideas or groups of ideas which in their very nature or make-up seem to require wider associations. For example, when the child starts to school, the idea complex c-a-t seems to be ended in itself, the child can rest satisfied if he never goes on to 'cats' or the c a t-c a n-r u n, although he may wish to learn to read. But present the idea complex of the story of a-hen-a-guinea-pig-and-a-cat, etc., or a live-kitten-chasing-its-tail, and what a going-on there is in the mind until the story is heard or the kitten is captured and examined from tip of nose to tip of tail! Tell a man of science it is a fine day, and he takes it calmly. Tell him the causes of the earthquakes along the Pacific coast have been discovered, and his consciousness immediately takes the attitude of inquiry and the thought shapes itself with a blank, 'the causes of the earthquakes are — ?'

So the contents of consciousness must be just those which are provocative of the right attitude of inquiry, of gaps. They are the ideas which have many points of attack or attachments. They must lead to motor activities, especially for the child. If it is true that every idea tends to find motor expression, those ideas which permit of this most naturally are the ones most easily engaged in the acquiring of new ideas, for it is through motor accommodations of muscle and neural adjustment of the sense-organs that we learn again. So the ideas of sense or perceptions are easily the ones which have the greatest learning capacity in childhood, and perhaps later, too, for most of us. We say those contents which have this power of awakening and controlling the other ideas are interesting, and we call them interests. They are constantly changing, and yet very

early they mark out the permanent lines along which the mind moves with the greatest freedom and activity.

As to the form of consciousness which is most conducive to learning: Is consciousness composed of clear-cut knowledge, definite ideas arranged in logical form, or is it a mass of 'unformed concepts,' vague fringes of consciousness, half thought, half feeling; *i. e.*, is it objective or subjective? Too often pedagogy has taken it for granted that consciousness is dealing with exactly the same material in the same form while learning that it does later when the subject is learned, and hence it has given rules for the arrangement of definite ideas instead of for forming the clear, definite ideas out of the vague, confused state popularly called feeling, through a transition stage which we call interest, until the ideas stand out clear and well defined and expressible in words. The process of real learning is making the subjective objective; that of teaching is making the objective subjective. Too often the process of teaching has been that of trying to make the objective in the teacher's mind appear at once as objective in the pupil's without the intermediate stage of subjectivity in the mind of the child. That sort of teaching is, as the Irishman said, the kind that 'runs in at one ear and out at the other, like water off a duck's back.'

To be a little Berkeleian, whatever has not gotten itself into our consciousness, absolutely does not exist for *our consciousness.* A piece of cake exists for a child before he lays hold of it and eats it, just as it does for an adult and other children, but a psychical experience of a thing in the individual's own mind is the only possible way in which it can exist, and this existence usually begins, more or less, in what I call a subjective way, *i. e.*, as a fringe of consciousness or a mass of vague ideas, fusing, as it were, with other ideas present; and it is this particular fusion state which is peculiar to each individual, and which he can not communicate to any one else. Gradually the new ideas work their way into the focus of consciousness, take the form of speech or words, and so can be made objective. Truly language is the test of the objectivity of knowledge, and so most teachers spend their whole effort on the testing process and have not given the proper attention to the preliminary conditions. As I look back on myself as a child, it seems to me that my school work was mostly the testing process, but in the long vacation months—there were always from six to seven of these months, fortunately for me—I drank in with the air a love and a consciousness of birds, flowers, sky, water, earth, literature and people, and was only grieved that all *my* questions were not answered. I never felt that I *had* to make all this objective, *i. e.*, tell any one about all this won-

derful world, but I wanted to, and to know the names of things, the reasons for things and their relations, and to tell what I had discovered myself. But this was first of all mine, my own that I could not share with anybody, and for that reason so precious, for I must keep it well until I could make it of value to others. To the genius nothing is more noble than the objectifying of his subjective consciousness, making what he has felt objective for all men. The poet, wrestling with the thoughts which have gripped him, will not let them go until he has received the blessing of words which enable him to give them a free gift to all mortals.

And so the learner takes what is objective to his teachers, fuses it with his own peculiar thought in this subjective state, and then puts it in the form of words and gives it back as his own objectification of his own experience. From the vague state it appears in the focus of consciousness with a peculiar subjective fringe of its own. This process, this transition from feeling to thought, we have called interest.

By the structure of consciousness, we mean those organizations of ideas with varying factors, such as memory, imagination, inductive and deductive reasoning. Which structure is most common in the best learning? We must not confuse this with the question, Which is the best structure for arranging and preserving knowledge? Where the aim is to keep the objective in the same language, I think we will agree that memory is necessary, but for what we mean by learning, making subjective truth objective, we must admit that something else is needed, for memorizing is associating ideas already objectified, ideas with which we dare not take liberties, as they have their definite relations of time and space, of cause and effect, of quantity, of position and other like relations. We can hardly be said to remember things until they have truly become objectified; so long as they are mostly fringes they never come back to us the same, and so they have constantly different associations. A feeling in its purest state is most largely made up of organic sensations, very vague fringes, and so is practically unmemorizable.

Now real learning, as we have said, is mostly working with fringes of consciousness, since the process is making the vague subjective clear and objective, and so a structure which admits of free groupings and recognizations is our best form. Perhaps it most often takes the grouping of imagination, *i. e.*, the mind makes freely any sort of connection it will between ideas old and new; that may be the end of it, or it may begin sorting out those ideas and making those connections which are necessary to fill the gap,

answer the question, and which finally shall sum up in a broad general statement all the details and be available for future details of a like nature. This is the inductive method, broadly speaking, and when this general statement is used to interpret other ideas, then it becomes deductive reasoning. Perhaps we have so long regarded the deductive as the structure best adapted for learning because it is the communicable stage, the teaching stage and the stage which the teacher is supposed to have reached before he himself can teach.

If we return to our observation of the child, I think we will find that imagination is the prevailing organization, and in the man of genius also, whether poet or scientist, there is just this ability to make new, free associations. The wise teacher, then, will be a person who, instead of doling out objective truths with one hand and with the other receiving back from the pupil the same idea stamped with the pupil's brain trade mark, shall rather be an interesting personality, a psychical and moral object in the pupil's environment from which the pupil can enlarge his own subjective experience. He is not to dictate the conditions of learning, but be on hand to supply the ideas which will be food for the already interesting ideas of the child, or even to help the child find his own interesting ideas. He must serve as the model for the 'trying on,' as Dickens's dolls' dressmaker, Jenny Wren, would say, of half-subjective, half-objective ideas; and he must be on hand to help in the organization from the loose structure of the imagination up through inductive reasoning to the compact form of deductive reasoning. He must help the child in his first-hand manufacture of knowledge, not cram him with second-hand material until his mind is a lumber-room. Or, again, he must not put in a grain of wheat and expect to receive it back immediately, but he must be content that the seed shall sink into the ground, decay and spring up quite a different-looking object from that which he gave forth, provided only that it bears promise of bearing seed in its turn.

Thus we see that the psychology of the learning process is not dealing with ideas and their associations primarily, but with the turning of subjective ideas and sensations, unexpressible in words, into the objective expressible, which can be given forth in the form of logical speech.

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DISCUSSION

PRAGMATISM VERSUS SKEPTICISM

THE ingenious and interesting way in which Professor Russell continues in Vol. IV., No. 9, of this JOURNAL the discussion started by his papers in Vol. III., No. 22, and Vol. IV., No. 3, brings it vividly home to me how rash it was for a doctor of science to undertake, even in jest, the duties of a doctor of medicine. For Professor Russell, at once claiming, on the strength of my remarks in Vol. IV., No. 9, the position of a patient, now demands to be cured by correspondence! I feel somewhat like the over-ingenious Mr. Frankenstein, and must confess my inability to endow Professor Russell with a pragmatic soul. However, as I dare not run away, I must try to persuade him that he has no real use for such an encumbrance!

I

Professor Russell's verdict on my criticism of his first article is that it leaves his "original proposition entirely unaffected. It still remains true that whatever practical problem this man shall solve, that solution is possible *only* if his action or his thought conforms to objective conditions which his purpose does not constitute."[1] I venture, however, to think that whether or not *I* have in any way damaged his original proposition, he himself has seriously mutilated it. For what he said at first was, "His idea was true *for no other reason* than that he thought or conceived this environment as it in fact was."[2] The difference seems to be that whereas *originally* Professor Russell contended that to think the environment as it is in fact is the *sole* condition of truth, he now holds that it is *one* (but not necessarily *the only*) condition to recognize a reality other than the agent's purpose. And where or when have any of us ever denied that? Even the extremest form of the doctrine of the 'making of reality' certainly does not deny that there is a reality already made, which it is pragmatically expedient to recognize. Indeed, so far is it from being true that pragmatists have ignored the obvious existence of 'objective' factors in cognitive situations,[3] that the fact seems rather to be that they have unceasingly labored to impress on the naïve objectivism of their critics the embarrassments into which they have plunged by overlooking the existence and im-

[1] Italics mine. Vol. IV., p. 259.
[2] Italics mine. Vol. III., p. 601.
[3] Vol. III., p. 600.

portance of the subjective contribution in all recognition of 'reality.' Certainly this was all I aimed at in commenting on Professor Russell, and all I meant by saying,[4] "It is quite erroneous to suppose that such situations do not contain a contribution from the subject which is essential to constitute their 'reality.' " *I. e.*, whatever the 'objective' conditions a human purpose may recognize, this recognition is needed to constitute their *relevancy*, and so to make them parts of the 'reality' reacted on. Moreover, Professor Russell can not wholly have misunderstood me; else why should he now say that I 'admit that *some* part of the entire reality of the given situation was not determined by the purpose' of the lost traveler?

A departure from the most obvious meaning of his original statement is not, however, the only remarkable feature of Professor Russell's reply. He urges also, that just *that part* of the environing reality which determined the success of the agent's reaction is what makes an idea 'true.' That this assumption was part of the intellectualist's case has, I think, always been perceived by us; but it has always been impugned, and to keep on repeating it is not to prove it. Perhaps the issue may be put more clearly by saying that it seems arbitrary and unjustifiable to dissever a 'truth' which admittedly comes about through a *conjunction* of 'subjective' *and* 'objective' factors, and to assert that the second *alone* of these makes it 'true.'

One of my criticisms concerned the ambiguity of Professor Russell's use of the word 'determined.' I wanted to know whether or not it meant 'fully determined.' For if it does, Professor Russell's illustration seems to fail because the situation could not really be so rigid as to admit of no alternatives of action; if it does not, his analysis does *not* exclude a subjective contribution to its reality made by the agent. In his reply Professor Russell does not answer my inquiry, but uses the word over again just as ambiguously as before!

He rests, however, his final appeal on the meaning of the phrases 'lost' and 'know the way out.' The meaning I assigned to being 'lost' is, he admits, consistent with pragmatism, but it strikes him as a *reductio ad absurdum*. But he clearly has never heard the story of the steward who asked his captain whether a thing was lost *if one knew where it was*. "Of course not, you fool." "Then your silver teapot, sir, is not lost; for I marked the place where it slipped out of my hands and fell overboard!"

I fear Professor Russell, therefore, has not observed how sadly ambiguous are the phrases we have been discussing. I had said

[4] Vol. IV., p. 43.

that any one who did not care where he was or whither he went could not be 'lost'—meaning, of course, *subjectively*. He could not feel 'lost.' But, of course, Professor Russell might be very anxious about him, if the 'lost' one was a child of his who failed to turn up for supper. Clearly the situation, and the words which describe it, vary according to the point of view from which they are regarded. Of course, if Professor Russell can lay it down as an absolute definition applicable to all cases that 'lost' means '*not knowing the way out,*' he could prove his point. But he clearly has that rare and precious thing, the universal consensus of mankind, against him on this question. We are all in the position of the child that neither knows where it is, nor cares whither it goes. We are *all* 'lost,' if 'lost' can mean nothing but 'not knowing where you are,' absolutely and without regard to human purposes. For no one does actually know the absolute position of the earth in space at any given moment. And no one cares! For it makes no difference to any of our present purposes, and the relative knowledge we have is *true enough* for us.

Clearly, therefore, the phrase 'knowing the way out' can, much like 'lost,' be interpreted pragmatically. It must mean 'knowing how to act so as to get out.' And so in Professor Russell's own example. If he had chanced to fall into a pit of his own digging, and broken his back, he would find that the most perfect map of its details and the most complete knowledge of its structure would not amount to 'knowing the way out' of the situation. I greatly fear that despite his accurate 'knowledge' of the longitude and latitude of his pit, his friends would give him up for 'lost,' and that when his blanched bones were ultimately found poring over his pathetically useless 'map,' any one who protested that he had never been 'lost,' because he had to the last 'known the way out,' would be suspected of heartless mockery rather than of a firm grasp of the true theory of truth.

II

I have more difficulty in dealing with Professor Russell's response to the pragmatic cure of skepticism recommended to him, because his reasoning seems to me somewhat elliptical and obscure in places. I gather, however, that he claims to possess (p. 241) what is denied to me and what I understand some hundreds of intellectualist philosophers are at the present time anxiously seeking, *viz.*, a clear and consistent conception of the intellectualistic meaning of 'truth.' This evidently imposes on him the obligation of taking the earliest opportunity of enlightening the world. And, more

particularly, he should tell us how 'the truth of a truth' and 'that which produces in his mind the certainty of this truth' manage to be 'quite distinct and separate' despite the fact that he can never arrive at the first except by way of the second. Assurances also are needed to show that his somewhat concise references to the pragmatic doctrine of truth do not conceal serious misapprehensions. To say, *e. g.*, that 'pragmatism identifies truth with satisfactory experience' may, perhaps, pass muster as a rough reference. But for purposes of exact discussion it is surely necessary to explain that the 'truth' (claim), which is tried in order to see whether it will bring satisfaction, is different (or, at least, in a different condition) from the 'truth' which has been validated by the satisfaction it has brought.

Now I can not find that Professor Russell's language anywhere recognizes this vital distinction, and so do not feel sure how far (if at all) he perceives it. If he does, he should surely observe that to say that 'the proof of the pudding is in the eating' refers not to the process of eating, but to its consequences, the nutrition, and so his inference should run, 'therefore the *nourishment* is what makes the pudding good to eat.' So interpreting these maxims, I fail to see any absurdity in them, and can only suppose that the ambiguity of 'eating' has deceived Professor Russell. Similarly, if we abstract from all problems of digestion and turn the maxim into a mere question of taste, it seems quite possible to interpret it, 'the test of the pudding is in the taste when eaten; therefore, this taste is what makes it "good to eat." ' Or, to abandon these over-dazzling metaphors, the proving of a truth (= claim) comes in the satisfactory experience to which its assumption leads: this satisfactory experience is what makes the 'truth' valid. I can not help thinking that Professor Russell's difficulties arise entirely from a refusal to take 'truth' simply as a human valuation, while those of his readers arise from his reticence about his own conception of 'truth.'

I am still more puzzled by what purports to be Professor Russell's answer to my inquiry whether he recognized the existence of ultimate choices. Nor can I quite understand how Professor Russell can know *a priori* that by trying the pragmatic interpretation of truth as an intellectual hypothesis he can not assuage his 'theoretic' doubts. It is clear that he considers himself debarred from trying this intellectual experiment. But why? Is the reason merely that his devotion to his meaning of truth, of which he makes such a sacred mystery, is such that he can not bear even to think of another? If so, one can but admire his heroic fidelity to a mistress who has avowedly abandoned him and thrown herself into the arms of the skeptic. Or does the trouble arise from the fact that even to

experiment with a new sense of truth involves a provisional adoption of it, and that if the experiment succeeds, it must establish a new sense of 'truth,' which, as superseding the old, will naturally not be 'true' in the old sense? If so, Professor Russell's position will be just about as reasonable as that of a sick man who, while admitting that the conventional 'cures' failed to cure him, yet declined to try a new one on the ground that if it succeeded it could not be a 'cure' in the same sense as the old ones.

A less determined doubter, however, would probably consent to regard the prospective success of an experiment as a reason for making it rather than for abstaining from it. He would not, therefore, feel it a hardship to pass from an *unsatisfactory* interpretation of truth to one more satisfying. Nor would he find it impossible to *combine* the second, third and fourth of the motives separated by Professor Russell on p. 242. He might, that is, find doubt psychologically irksome, and so consent to try an alternative. This willingness to experiment with the pragmatic sense of truth might then lead to his finding his whole experience so agreeably transformed that his 'philosophic doubts,' being no longer nourished by his belief in a 'theoretic' truth and a 'logical understanding' calculated to evoke doubt in the most uncritical breast, would die of inanition, until finally the whole impotent phraseology of his old self-contradictory beliefs might come to seem an unreal and futile figment.

Of course, however, if he does not want to give up his skepticism, if he enjoys it and it really satisfies him, nothing of the sort will happen. Nor do I see what could *compel* him to change his cognitive attitude. A skeptic who enjoys his skepticism has a doctrine which is *pragmatically true* for him. Any one can be as skeptical, as he can be unreasonable or inconsistent, as he pleases. The only advantage the pragmatist has over the dogmatist in dealing with such folk is that he is not bound to make useless attempts to convince them, and can leave them alone with a good conscience. Pragmatism is a very humane and tolerant philosophy. It does not fulminate threats of intellectual damnation against the heretics who scorn the eternal verities. It simply leaves them to take the consequences which their theories must entail in practise. The rationalist, on the other hand, is bound to waste his energies upon such creatures. He must aim at bringing about the universal agreement which his belief in 'reason' presupposes, under penalty of finding that otherwise the meanest dissentient, and the least discrepancy, form conclusive refutations of his theory.[5]

[5] *Cf.* 'Studies in Humanism,' Ch. XII., § 10.

Now how far, if at all, these remarks apply to Professor Russell I shall only be able to determine when he answers my questions. I do not know whether he believes in choices. I do not know whether he likes being a skeptic, or even how seriously he is one. I do not know how he understands skepticism, or how dogmatically he holds it. I do not know whether he deems it insufficient for pragmatism to prove itself true according to its own understanding of truth, or insists that it must do so in some sense of which he alone possesses the secret. I do not know why he prescribes these strange conditions. I do not know why it should vex him to think that in the end 'truth' and satisfaction may depend upon the human attitude and point of view, or astonish him to discover that if men choose to speak different languages they can not possibly understand each other and had much better stop quarreling. But it distresses me to notice how prone philosophers of the rationalist persuasion are becoming to declare that reasoning is vain.[6] Professor Russell's conclusion about the pragmatic heresy seems to be almost verbally identical with Mr. Joachim's about the realist heresy. Both admit that the views which they (nevertheless) attack are not internally refutable; both, after firing away their ammunition, prohibit their opponents from arguing with them. If this be skepticism, it is skepticism which has been carried to the length of doubting its own ability to defend its position. But one gets a feeling that it may be only disconcerted dogmatism in disguise, resenting its inability to extort the assent of all minds by the might of a 'reason' which it has wofully misconstrued. For the present, however, it will probably suffice to call upon the recording cherub, who smiles aloft at the contentions of philosophers, to take note of the fact that Professor Russell 'declines to take' a remedy, which he judges to be worse than his disease, *a priori* and without trial.

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A LAST WORD TO DR. SCHILLER

DR. SCHILLER has made what seems to me a very surprising discovery, namely, that in my second article in reply to his criticism I have widely departed from my original position, that my supposed man's idea was true for no other reason than that it agreed with his environment.

According to Dr. Schiller's interpretation of my statements in

[6] *Cf.* Mr. Bertrand Russell in *Mind*, Vol. XV., pp. 532–3.

my second article, I admit that only in *part* is the truth of an idea determined by objective conditions; that in part the truth of an idea is determined by the subject.

Now, I must confess that to extort such a meaning from my language is a feat of exegesis rarely seen, even in the field of philosophical criticism. Now, what are the facts? In my first article, my contention was that the lost man's solution of his practical problem depended upon his idea of the environmental conditions in which he was at the time, and that this man's idea was true for no other reason than its agreement with these objective conditions.

In replying to Dr. Schiller's objections, I allowed him to put in the place of what he had called a 'babe in the woods' any sort of man he desired; and I maintained that, whatever practical problem this man might have presented to him, that problem could be solved only on the same condition on which the solution of the problem I had supposed was solved, namely, the agreement of the man's idea with objective conditions, which, of course, this man's purpose did not constitute or determine. I availed myself of my critic's admission that some *part* of the total reality of the given situation was not determined by this man's purpose or idea; and my contention was that it was *just this part* of the total reality which determined which idea should be true and, because true, be able to lead into the desirable experiences of safety, shelter and satisfaction of hunger.

Now, how my critic can manage to make out of these statements a substantial abandonment of my original position is, I confess, beyond my comprehension.

My critic charges me with an ambiguity in the use of the term 'determined,' in that I decline to say whether I mean *fully* or only *partially* determined.

I had said in my original article that the traveler's idea of his environment was true for no other reason than that he thought this environment as it in fact was when thought. I had supposed it was unnecessary to add that the environment *fully* determined the truth of his idea. However, to set my critic's mind at rest on that point, I will say that the truth of an idea *is* fully or *wholly* determined by its agreement with reality.

Dr. Schiller's attempt to escape from the logical consequence of his pragmatic meaning of 'being lost' is, I think, hardly a success. He will mean by being lost, 'the man feels lost.' Pray, what does this mean? Does it mean (1) that he is simply aware or immediately knows that he is lost? In that case, the being lost remains as objective a fact as it was before. (2) Does he mean the man feels in a certain way *about* the fact of his being lost, that this fact gives

him apprehension, fear, distress of mind, etc.? In that case, the being lost and the emotions excited by this fact are quite distinct things; and being lost is no merely *subjective* fact. (3) Does Dr. Schiller mean that the man feels his impotence, his physical inability to get out of the situation—to shelter, or food, or home? Apparently this is Dr. Schiller's meaning, for he proceeds to exhibit me as a lost man in my self-digged pit, with a broken back and with a map of the forest in my hands, and yet a lost man, both to myself and to my friends; and lost for no other reason than that, owing to my damaged anatomy, I can not get out of that pit. Let me suppose that Dr. Schiller should go into London some day, and be taken ill and be conveyed to a hospital; let me suppose that he knows London as well as I do my little town among the Berkshire hills, that he knows the way to his home while in the hospital; that his friends likewise know where he is; would Dr. Schiller think he had truthfully described his situation by saying he was lost in the city of London?

My critic objects that I have failed to recognize what he regards as 'a vital distinction,' namely, that between the truth, or the truth-claim, of an idea and the validated truth-claim, or the truth after it is validated. Now, I admit that I have not recognized the sort of distinction he tries to establish, and for the reason that no such distinction can be made out by a consistent pragmatist. For the intellectualistic meaning of truth, there are two distinctions which are both significant and important. (*a*) The distinction between the fact that a given idea is true and our certainty, or knowledge, of this fact. (*b*) The distinction between the truth of an idea and a verifying process by means of which the knowledge of this truth is attained. Now, my contention is that pragmatism can make no 'vital' or significant distinction between the truth of an idea and its verification. For consistent pragmatism the verity of an idea *is* its verification. The pragmatist's *truth* is a thing that is *made*, and the only distinction that can be admitted is that between the beginning of this process of truth-making and the completion of the same process, between an idea's being potentially true and its being actually true.

In concluding this last word to Dr. Schiller, I will, as briefly as possible, answer what are, in effect, questions put to me.

1. Do I believe in choices? I certainly do so believe, and I believe that they take place between genuine alternatives.

2. Do I like being a skeptic, and how serious am I in my skepticism? Well, I sometimes wish I could be as certain of some things as some of my pragmatist friends appear to be; but, on the whole, I am reconciled to our human ignorance and absence of theoretic

certainty touching matters of most momentous import to our lives. I am willing to remain theoretically uncertain and to make the venture of faith, and to wait the issue of that venture.

3. Do I know what skepticism means? I am by no means sure that I know what Dr. Schiller means by skepticism, but I think I can tell what the philosophic doubt about which I have written somewhat means. To me this doubt means a state of mind in which, because of the absence of logically compelling evidence, one can conceive a given subject-matter otherwise than for practical reasons he *does* choose to think it. I mean that, in reference to some matters, one can doubt what one is willing to treat as true or fact.

4. Do I deem it insufficient for pragmatism to prove itself true according to its own understanding of truth? I do not see how a pragmatist can reasonably undertake to convince any one by reasoning that his doctrine is true. He can only exhort others to become pragmatists in some other way than by reasoning oneself into the acceptance of *his* truth.

The pragmatist has so changed the meaning of the terms truth, true, verification, etc., that there can be no such thing as obeying his invitation to the intellectualist, 'Come, let us reason *together*.'

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ULTIMA RATIO?

IT appears from Professor Russell's last reply (1) that the ambiguity of language has once more defeated a sincere attempt of philosophers to understand each other. It certainly appeared to me that when Professor Russell declared (in Vol. III., p. 601) that an idea was true 'for no other reason' than that it agreed with an independently given reality, he meant to assert that nothing else mattered, and utterly to deny that human attitudes and ways of taking a situation had any bearing upon its 'truth.' Whereupon I ventured to point out that even in extreme cases such human attitudes *did* affect the description called 'true.' In Vol. IV., No. 9, however, Professor Russell clearly seemed to assert only that its relation to 'independent' reality was his sole reason for calling the operative idea 'true,' leaving it in doubt whether or not he denied the influence of the human attitude upon the description of a situation. To convey this latter meaning to my mind, he should have stressed the *'true'* in his original statement. Had he done this, I should promptly have inquired (as I do now) whether he denied the relevance of the

human attitude to the 'truth' of a situation. For what I wanted to know (and still desiderate) is whether Professor Russell's doctrine is that the 'objective' conditions *alone* affect the '*truth*' of a cognitive situation, or whether subjective conditions also are allowed to enter into it, though it is in virtue of the objective conditions alone that the predicate 'true' becomes applicable to it. The former of these interpretations clearly goes much farther, and that it is manifestly false was what the example of the 'Pragmatic Babe' was designed to illustrate:[1] the latter, which I recognized, of course, as the position taken up by Professor Russell in Vol. IV., No. 9, only seems to me an essentially arbitrary and unproved assertion (as I remarked in the third paragraph of my first paper in this number), which well illustrates the divergence between the pragmatist and the intellectualist use of the term 'true.' But I am quite content to leave the matter there, if Professor Russell will only note that from first to last he has given us *no* information as to how *he* proposes to deal with the subjective evaluation of the objective conditions, and has *wrongly* attributed to pragmatism an unqualified denial of every sort of objectivity, however provisional and derivative.

(2) I am also quite content with Professor Russell's present declaration that by 'determined' he means 'fully and wholly determined' by the objective conditions. For I can now defy him to adduce any situation which *is* so determined as to leave an intelligent agent no alternatives whatsoever. And I need only add that inability to adduce such a situation must be regarded as a fatal objection to the intellectualist analysis of cognitive situations. It also seems to me that Professor Russell has here missed a grand opportunity of applying the belief in the reality of choices which, I am now glad to learn, he still retains.

(3) As regards the meaning of the phrases 'being lost' and 'not knowing the way out,' my humble purpose so far has merely been to convince Professor Russell that they are ambiguous and quite susceptible of a pragmatic interpretation, and that here also he has been blind to the subjective side of the question. But as the result seems merely to have been to deepen the confusion, it is now, perhaps, time to state how pragmatism would account for the ambiguity.

The fact seems to be that in ordinary life and language we make no distinction between a 'truth' which is actually functional and one which is merely potentially so. The truths which, in Professor James's admirable phrase,[2] have gone into 'cold-storage' and those which are glowing with the heat of battle are alike called truths.

[1] Vol. IV., p. 42.

[2] 'Pragmatism,' p. 231.

The reason for slurring over this difference is, of course, itself pragmatic; it is unnecessary, and even inconvenient, to distinguish them for ordinary purposes. But philosophically it is vital to observe the subtle alternations which occur in the values of truths as a situation develops.

For example, to take Professor Russell's pet case. If he is wandering alone in a wilderness where he 'knows the way out,' his knowledge is functional, and would be judged to be 'true' by all. But if he falls and breaks his leg, it at once becomes 'potential.' He can, that is, no longer *act on it,* and it becomes a question how long it will continue to be called 'true.' If no help comes, he will gradually come to realize that under these circumstances it is no longer relevant to the 'facts' of his life, and no longer performs its normal function of guiding action, and therefore is no longer worthy of the name of 'truth.' He is driven to admit that he no longer 'knows the way out' in any real sense, that his 'knowledge' is a mockery, and that he must give himself up for 'lost.' But now suppose that he is found by a well-equipped party of travelers, who have 'lost' their way, but are physically able to proceed. At once the 'knowledge' of Professor Russell and the physical powers of his rescuers become 'useful' again and relevant to the situation. They combine, the knowledge becomes functional, and, by enabling both parties to achieve their purposes, saves the situation. This sketch of the actual functioning of our knowledge deserves, no doubt, to be drawn out at length, but it should suffice to explain why it seems to us so unwarrantable to conceive potential truths as essentially non-functional and useless. Our complaint is that intellectualism has taken too narrow and abstract a view of their nature, and failed to see what common speech recognizes and reveals in its very inconsistencies and ambiguities, *viz.,* the relation of meaning to purpose.

(4) As regards the relation of the intellectualist and the pragmatist meanings of 'truth,' it is rapidly becoming clear both that, and why, the former will not accept the pragmatic distinction between truth-claims and validated truths. For, as Professor Russell has so admirably shown,[3] the intellectualist really holds that a 'truth' does not need to be validated to become true. The distinction, therefore, is to him irrelevant. He must believe in unverifiable truth by the logic of his position. To all this I cordially assent, though I like to speculate as to what will happen to intellectualism when this is generally perceived.

On the other hand, it should also be clearly recognized that both the distinctions which Professor Russell regards as significant and

[3] Vol. IV., p. 295.

important must be nugatory to a pragmatist. He can not separate the truth of an idea from our knowledge of its truth, or from the verifying process by which its truth is established. As neither distinction has any pragmatic value, they must seem to him to be devoid of sense. Unverifiable 'truths' he can not regard as truths at all: verity *is* verification, actual or potential, and again it gives me great pleasure to agree on this point with Professor Russell.[4]

(5) But does it follow either (*a*) that pragmatic propaganda is reduced to mere emotional exhortation, or (*b*) that both sides must stop reasoning because they have caught sight of the ultimate differences?

(*a*) Certainly not the former, I should say. For the pragmatic analysis of truth really starts from ground common to it and intellectualism, that of common usage and scientific method. It professes to analyze what we all mean when we predicate 'truth,' and merely to carry self-conscious analysis farther than it is necessary to do for scientific purposes, or possible to do with uncriticized prejudices. Its contention is that intellectualism involves a profound misconstruction of this common ground, that its vulgar forms really rest on a failure (or a refusal) to carry analysis as far as it can and ought to be carried, while the more refined attempts at intellectualist construction logically lead to the most gorgeous paradoxes. Hence we hold that *there is not really any such thing as a coherent intellectualist theory of truth;* and we suspect that no such thing is possible. We have challenged our opponents to produce one, but nothing has been produced that is even internally coherent. Hence it is possible that when intellectualist philosophers realize that they can neither give a rational account of the faith that is in them nor refute the pragmatic analysis, they may eventually conclude that the pragmatic position is, after all, the more rational.

(*b*) With regard to the second point, the situation seems more doubtful. For one must certainly agree with Professors James[5] and Russell that the differences of philosophers are largely temperamental at bottom. Ultimate philosophies depend in the last resort on sheer subjective choices between alternatives. Not that *I* should call these

[4] There is manifestly nothing in Mr. J. B. Pratt's attempt (in Vol. IV., p. 320) to treat verifiability and verification as antagonistic, and the former as distinctive of intellectualism. For (1) it is impossible to separate verifiability from verification—the potentiality does not exist apart from the actuality from which it is an *ex post facto* inference. A claim to truth, therefore, can only be regarded as verifiable on the strength of past experiences of verifications, and a 'verifiable' truth which is *never* verified is really unverifiable. Hence (2) *unverifiability* is the distinctive mark of a consistently intellectualist view of truth.

[5] 'Pragmatism,' lectures I. and VIII.

choices arbitrary and irrational, though I can see that they may very well appear so to an intellectualist: for, after all, the alternatives may spring from an equality of reasons. I should only regard them as excellently illustrating the 'primacy of will,' and so am not disposed to resent their existence. But for reasons of which I have stated some above, I doubt whether we have yet come anywhere near this ultimate ground of personal choice in the pragmatic controversy. If, however, Professor Russell should think otherwise, I too am quite content to let the matter rest in its present posture.

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REVIEWS AND ABSTRACTS OF LITERATURE

The Development of Symbolic Logic: a Critical-historical Study of the Logical Calculus. A. T. SHEARMAN. London: Williams & Norgate. 1906. Pp. 242.

In the preface the author states that "the form that the present work has taken is due to some correspondence which I had with Mr. W. E. Johnson in the year 1903. He pointed out to me the error of thinking of the various symbolic systems as being radically distinct, and as competing with one another for general acceptance. Rather, he held, it is correct to adopt the view that there is available at the present time what may be called *the* logical calculus, and that towards the creation of this calculus most symbolists have contributed.

"This idea has been worked out in the following pages. I have traced the growth of the subject from the time when Boole originated his generalization to the time when Mr. Russell, pursuing for the most part the lines laid down by Peano, showed how to deal with a vastly wider range of problems than Boole ever considered. My attention has been occupied, that is to say, upon the questions to whom we are most indebted for those rules of procedure that may be said now to constitute the calculus, what important differences of opinion have arisen as the subject has been gradually thought out, and which of the conflicting views we find it correct to adopt. The investigation has thus been quite as much critical as historical, for, in demonstrating who have contributed to the creation of the logical calculus, it has been necessary constantly to point out, in the first place, why certain views have to be rejected as being incorrect, and secondly, wherein one of two suggestions, both of which are excellent, shows an advance upon the other.

"Portions of some of the chapters have appeared in a paper which has been published in the *Proceedings of the Aristotelian Society.*"

To quote Mr. Shearman again, his order of exposition is as follows:

"In the first three chapters I suppose that we are confronted with a complicated set of premises and are required to draw a certain conclusion from them, or that we are given a certain conclusion and are required to assign premises from which it may have been drawn. At each stage in the solution I shall endeavor to show which logician it is who has proposed the best method of procedure to be adopted at that point. In this way I hope to make clear that there has been real development from the time of Boole, and that the principal contributors to the development are Venn, Schroeder, Keynes, Johnson, Mitchell, C. Ladd-Franklin and Peirce.

"Then in Chapter IV. I prove that those who have been engaged in elaborating the calculus were justified in proceeding by way of an extensive rather than by way of an intensive interpretation of the proposition." Chapter V. is occupied with Jevons and MacColl, both of whom 'have, indeed, proceeded by way of extension, but who have, in my opinion, fallen into serious errors.' "Up to this point the investigation is concerned with what may be called the ordinary symbolic logic, and with its ordinary employment. In the next chapter I refer (1) to the logicians who have shown how the principles that are utilized for the manipulation of propositions with single quantifications may also be utilized in the case of double and multiple quantifications; (2) to the view that, though such multiple quantifications may be successfully manipulated, it is not possible to treat copulæ in a general manner, and so arrive at such a logic as the expression 'logic of relatives' naturally suggests to the mind; and (3) to Frege, Peano and Russell, who have shown that, when certain distinctions are made which the older symbolists passed by as unimportant, and when a suitable interpretation is given to the conceptions of quantitative mathematics, both the comprehensiveness and the utility of symbolic logic are greatly increased. Finally, having thus traced the development of the subject, I devote a chapter to the consideration of the uses of symbolic logic, both in its less and in its more extended application."

To turn to a closer view, the first chapter deals with 'Symbols as Representing Terms and as Representing Propositions.' The author holds that, in the case of the problems of the earlier symbolic logic, "it makes no difference, so long as the appropriate rules are observed, whether we let our symbols stand for terms or for propositions. But, when we come to deal with the problems that are not included within the scope of the Boolian treatment, I admit that it is better to let symbols stand primarily for propositions."

Besides the question whether or not symbolic logic deals primarily or exclusively with propositions, is the question to what kind of propositions in any case it must confine itself. The author answers, 'with assertorics only.' Other propositions, *e. g.*, 'the probably true,' are material with which the symbolist has nothing to do. In this case, 'for the simple reason that it does not exist.' The probability of an event can be measured, 'but the probability of the truth of a proposition has no meaning.'

A similar truth holds (as Mr. Johnson has made clear) regarding the manipulation of propositions respecting probabilities. Likewise, to the division (MacColl) of propositions into various classes besides the true and false, the author objects; 'this procedure is based on the fact that the considerations according to which such classifications are reached, all refer to the relation in which the thinker stands to the proposition, and not to the proposition itself.' For such facts new terms must be introduced. They are new propositions.

Chapter II. deals with 'Symbols of Operation.' The author discusses the uses of the symbols $+$, $-$ and $\div$; and defends the use of the latter two. Although the minus sign is not absolutely necessary ('since subduction may always be expressed symbolically as restriction'), it is frequently more convenient to employ this sign. However, the sign is appropriate only as denoting subduction. Regarding the sign $\div$, our author asks, "Has this inverse process any rightful place in symbolic logic, or is it a survival of merely historical interest? I hold that for two reasons the process ought without hesitation to be retained. In the first place, the mental exercise involved in arriving at the comprehension of what is implied in the performance of such inverse operation is, as Venn maintains, of the greatest utility. And, in the second place, the operation is capable of yielding absolutely reliable results."

He next discusses the symbols used to express the indefinite element in the universal affirmative, *e. g.*, $\frac{0}{0}$, showing that in suggestiveness and usefulness there is little difference between them, but adding that $\frac{0}{0}$, if so used, must not be employed (Boole) to represent particular propositions.

How are particulars to be symbolized? Venn's way is best, that is, $xy = v$ or $xy > 0$ (resembling Mrs. Ladd Franklin's xyV). To Venn we owe the recognition of the existential character of particulars, to Mrs. Ladd Franklin a convenient notation of them. The latter logician has not, however, succeeded in giving us formulæ 'that would deal with particulars with as much ease as the formulæ that Boole proposed for universals deal with these.' In short, 'she did not succeed in presenting a general treatment of the subject.'

How may hypotheticals be dealt with? "Venn and Boole can not in their class logic deal generally with the pure hypothetical, for their procedure is to express the premises of an argument as though these in every case denoted class relationship. But if we follow the course adopted by certain other logicians (MacColl, Johnson and Russell) and allow symbols to represent propositions rather than classes, the pure hypothetical can receive adequate treatment."

Chapter III. deals with the 'Process of Solution.' For the direct problem there are two methods, the analytical and the diagrammatic. Regarding the latter, after pointing out the steps forward taken by Keynes, Venn and Marquand, the author adds: "If the symbolist employs diagrams, he is guilty of a somewhat retrograde movement. For in the

case of a figure we have to a certain extent *to think* out the answer, whereas a genuine calculus supplies us with a mechanical contrivance by which results may be reached with no other thought than that which is required by a person who manipulates a machine."

In his consideration of the inverse problem, Mr. Shearman points out especially the important contribution of Keynes and of Mr. Johnson. "Mr. Johnson first of all shows clearly that, by a process of multiplying out, the inverse problem may be solved by a direct process, and that we are not, as Jevons maintains we are, here limited to a series of guesses."

One of the most interesting chapters is entitled 'A Calculus Based on Intension.' In this the author first examines Castillon's 'Sur un nouvel algorithme logique,' as being the most consistent attempt to base a calculus upon intension. He finds that Castillon was led into many and serious errors, and that a calculus can not be elaborated in the way he described. His calculus can make use only of universal affirmatives, real particulars (in which 'some' means 'some only') and universal negatives, of which the second and third are inconvertible. Moreover, 'it is not possible consistently to deal with hypotheticals.'

The author's conclusion is not that there can not be a calculus based on intension, but that it would lack naturalness and simplicity and would be far inferior to that which deals with classes directly.

Chapter V. examines the work of Jevons and of MacColl. Great as was Jevons's influence, his reputation 'must not be based upon the fact that he contributed in any important degree to the creation of symbolic logic,' nor has MacColl assisted in erecting this symbolic structure. Where MacColl differs from other symbolists, there he is in error. His 'two chief errors consist in his treatment of modal and kindred propositions, and in his doctrine of logical existence.' "All modal propositions may be reduced to assertorics, and as such symbolic logic deals with them. Again, logical existence is not to be confused with phenomenal existence. There are not two worlds of discourse, but one, and within this two compartments, the real and the unreal." Mr. Shearman's own summary of the following chapter has already been quoted.

The final chapter gives us an eminently fair statement of the utility of symbolic logic, both to education and to science. True, symbolic logic 'does not lead us directly to any new truths in natural science.' This, however, does not mean that no new truth at all is won through its use.

Mr. Shearman's book is not one for a beginner, for it presupposes considerable acquaintance with the work of symbolists, in fact, of all the authors whose work is discussed. However, it is especially valuable at a time, such as the present, when there is great need of taking an account of stock of what has been done in symbolic logic and that in a way that could not be done by giving us one more text-book or treatise.

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La causalité en histoire. M. SIMIAND. *Bulletin de la Société française de Philosophie,* July, 1906. Pp. 245–290.

At the session of the Société française de Philosophie held last May, M. Simiand advanced the thesis that in so far as historians seek at all to explain events, their explanations can not differ in any essential from those offered by the natural sciences, without thereby being convicted of insufficiency or error. They must start from the position that the *same causes must always produce the same effects.*

Selecting illustrations chiefly from Seignobos's 'Histoire politique de l'Europe contemporaine,' a work which he regards as more free than most from the faults he describes, M. Simiand shows that in many passages which profess to be explanatory there is merely the description of a gradual change; as though the historian supposed that by making the steps of advance many and minute he thereby explained, at least in part, the occurrence of that advance. In other instances the same cause is found productive of different effects. Particularly, individuals are cited as the causes of very different acts. But it is evident that in such cases there is a confusion of cause with condition. The true cause can not produce different effects.

An event is only explained when the causation which is offered in explanation is offered as a particular case of a general law. But if we attempt to subsume the explanations offered by historians under general laws, we often find it impossible.

M. Simiand then offered the following rules to govern all historians in their explanations of events. First, define in general terms the precise effect for which an explanation is to be offered. Second, to distinguish the cause from the condition, observe that among the different antecedents of a phenomenon, that one is the cause which can be bound to it by the most general relation. For example, an explosion is *caused* by a sudden expansion of gas, that being the antecedent of *all* explosions; whereas the spark might be replaced by a shock, the powder by dynamite, etc. As corollaries of the last rule, we have: that the cause should be the *immediate* antecedent; and that the effect can have no other cause save that offered in explanation—the explanation will be reciprocal. These rules will result in eliminating 'explanations' that are mere descriptions of evolution; individuals should no more be cited as causes of events; and finally, neither imitation nor the purposes of men will be regarded as causes, nor, indeed, any general psychological factors, such as instincts and impulses.

The discussion that followed served to bring out M. Simiand's point, that he by no means asserted it to be the primary function of the historian to explain events. But in so far as he does offer explanations they must be of the same type as those of natural science. His contention that there is an unnecessary lack of accuracy, that explanations are offered by modern historians which are no explanations, was not opposed. And the reforms he recommended in method received tentative endorsement

from M. Lacombe and others, except as regards the explanatory value of such general psychological factors as those above cited.

M. Rauh, however, urged that scientific explanations are not all of one type. And here, it seems to me, lies the weakness of M. Simiand's position. Every event takes place, both as a particular case of a general law and as a part of a totality. From this distinction result two types of explanation, which may be indicated by such terms as momentum and direction, action and movement, formal and final, mechanical and teleological. It has been urged that no science is free from both types of explanation. The contention may be wrong, but certainly we are not in a position to ignore it, as M. Simiand would ignore it, particularly in the realm of history, where, if anywhere, the distinction is valid. Perhaps the real purport of his paper is to limit the use of the term explanation. In that case his statement is liable to serious misunderstanding; for it seems a perversion of terms to say, as he does, that an explosion is explained by the expansive power of gases, but is not explained by the motives of the man that puts match to powder. While his paper may well promote precision in offering general explanations of particular events, it is not likely to persuade historians that general explanations are the only ones they may offer.

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La méthode de Descartes. A. HANNEQUIN. *Revue de Metaphysique et de Morale,* November, 1906. Pp. 755–774.

This paper is an unfinished first chapter of a projected work on Descartes, which the talented author had been preparing for some years, the work having been repeatedly interrupted by the ravages of the disease that caused his untimely death last summer, July 5, 1906. The editor of the *Revue* expresses his appreciation of the young philosopher's promise and worth in a foot-note to the article here reviewed, and also publishes, in the same number, another fragment by him, on the philosophy of Leibniz, which was also to have introduced a projected work.

The revolution which Descartes accomplished in philosophy was a necessary consequence of the revolution which Galileo had brought about in science. If the experimental method is specially characteristic of modern science, this is but the result of the need first voiced by Descartes, but felt by all investigators of rank, the need, namely, of applying mathematics universally to the solution of scientific problems. Descartes placed himself at the center of this new view of things, and developed a theory of knowledge that for the first time clearly exhibited the true relation between thought and things, giving to mathematics the supreme methodological position it deserves.

The *Regulæ* of Descartes contain the first exposition of this method, and constitute, in the opinion of Hannequin, the most valuable source for the understanding of its nature. To reach knowledge, or certainty, which are convertible terms, the human mind avails itself of only one method.

Mathematics, since it admittedly gives us certain knowledge, must disclose the clue to this method. Here we find only two conditions under which certainty is found, intuition and deduction, both of which, however, ultimately reduce to one, *viz.*, intuition. Intuition is not imagination or perception, but rational insight into the nature of an object immediately apprehended as simple and distinct. Hence the object is either apprehended truly, or not at all; error is excluded. Deduction presupposes an intuition, from which it passes immediately and by necessity to another term. It is the process by which the mind makes knowledge whose certainty is not in itself evident, to rest upon self-evident truth. Deduction is in a sense only intuition, but it requires a *movement* of the mind from one term to another, and can thus only exist by the aid of memory. It consists, not in the intuition of a second term, but in the intuition of a relation as making this second term necessarily dependent on the first, as in the case of an arithmetical progression. According to the usually accepted theory of the judgment, it simply renders explicit a preexistent but implicit relation between preexistent terms. But according to Descartes's theory of the judgment, it is a process of *deriving* a second term by means of a relation. The relation determines the succeeding terms, not the terms the relation. In Descartes the judgment is an act of constitutive thought, first by intuition positing a first term, and then by means of a relation giving this first term a complement, or a series of complements, which without the act of judgment would not exist. It is not the syllogism, but the judgment as thus defined, which constitutes the essence of thought.

Mathematical deduction is never syllogistic. Only two concepts are basal in mathematics, order and magnitude. Order requires no middle term for its derivation, since each element follows immediately upon its predecessor. And magnitude, while it requires for its expression a unit, which appears to be a third or middle term, nevertheless presents but a superficial similarity to the syllogistic process. The syllogistic middle is always a species, the mathematical unit is never a species. Descartes has thus hurled King Syllogism from his usurper's throne in the realm of knowledge, and made way instead for the rightful heir and claimant, mathematical induction.

The article, of which I have in the above attempted to give a summary, is written in a vivacious and lucid style. A criticism of its content would be a criticism of Descartes, and quite out of place in this review of a fragment published as a memorial.

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Die Bedeutung der nichteuklidischen Geometrie in ihrem Verhältniss zu Kant's Theorie der mathematischen Erkenntniss. W. MEINECKE. *Kantstudien,* June, 1906. Pp. 209–232.

The impossibility of proving the parallel axiom was the starting-point of the so-called non-Euclidean geometry. Lobachevski's method

of supposing that this axiom is false leads to sets of theorems which are contradictionless among themselves, though widely different from the theorems of ordinary geometry. These different systems are characterized by certain constants which are of the dimensions of a distance. Lobachevski tried to determine this constant for empirical space by measuring the parallax of Sirius and he found that triangles, the sides of which are of the order of magnitude of the radius of the orbit of the earth, do not show an appreciable difference from the triangles of Euclidean geometry. Geometry, then, is based on experience and its theorems have only comparative generality.

Against this argumentation Meinecke raises the question: How is it possible that sciences, which use mathematics as their basis, can support the validity of mathematical propositions? Their validity can be demonstrated only by an epistemological inquiry into the origin of mathematical knowledge. Such an inquiry seems the more important in view of the fact that the different systems of geometry, which were stated recently, apparently do not show a systematic order of their axioms. If we abstract from our ideas everything that corresponds to sensation, there remains time and space which are the forms of pure sensitivity. Kant proves their apriority by the impossibility of getting an intuition of other spatial or temporal forms, but Helmholtz holds that one actually may acquire the intuition of other spaces. The view of a non-Euclidean space, as described by Helmholtz, is nothing but Beltrami's representation of non-Euclidean in Euclidean space. The author tells from his own experience that he too believes he has the non-Euclidean space intuition, but whenever he tries to bring the object of his imagination into the focus of his attention, so as to see the hyperbolic parallels approach asymptotically, he was prevented from doing so by a feeling of dizziness similar to that which we have in dreams when we stand at the edge of a precipice. Of all the geometries there is only one, the Euclidean, which is real.

Philosophy of mathematics may start from Kant, but it must go beyond Kant. At first the rule must be stated that mathematics must not contradict logic, and since time and space are the objects of mathematics, one obtains the definition: Mathematics is the application of the logical calculus to the forms of pure intuition. The theorems of mathematics are *a priori* valid because mathematics deals with the pure forms of intuition. There are two branches of mathematics—analysis and geometry—corresponding to the two forms of pure intuition. Analysis is built on the notion of number. This notion is produced by the successive synthesis of the unit in time. The author finds at this point an obscurity in Kant's theory, which, however, does not impair its validity. Geometry is obtained by a further reduction of the logical possibilities, subjecting the conclusions to the conditions of space. The fact that the perception of space indirectly depends on the perception of time, explains why geometry never contradicts and never can contradict the results of calculus. It

also answers Lucka's question why it is possible to apply analysis to space. From this follows that there is among the axioms of geometry one which implies a temporal relation. The author comes to the conclusion that Kant's theory of time and space can explain the entire system of axioms which are the foundations of geometry, and that it shows also the possibility of non-Euclidean geometry as a part of the system. It may be required to deduce the axioms of geometry from the forms of space intuition.

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JOURNALS AND NEW BOOKS

REVUE PHILOSOPHIQUE. April, 1907. *Anarchisme et individualisme: Essai de psychologie sociale* (pp. 337–365): G. PALANTE. – The terms anarchism and individualism are usually confused. The former denotes a social system or economic doctrine which is moralistic, idealistic and optimistic; the latter an intellectual or sentimental attitude of an individual toward society; it is pessimistic, anti-dogmatic and disinclined to proselytism. At present anarchism seems to be dissolving into various forms of socialism. Individualism has a perennial character for psychological reasons, and will remain an indestructible form of human sensibility. *De l'esprit magique à l'esprit scientifique* (conclusion) (pp. 366–382): J. SAGERET. – The magic spirit survives in our day in religion, mysticism and poetry. It is opposed to the scientific spirit through its subjective character and corresponds to a logic of feelings, as opposed to ordinary logic. The scientific spirit is objective, amoral and 'asocial.' *La transformation des idées et le public* (pp. 383–408): A. BAUER. – The author traces certain transformations of fundamental ideas in esthetics, ethics, religion, philosophy and law. The innovations take hold and give rise to antinomies through certain dispositions of the public sentiment with which they agree. *Revue critique: The origin and development of moral ideas, d'après Westermarck:* P. FAUCONNET. *Analyses et comptes rendus.* Prudhomme, *Psychologie du libre arbitre:* L. DUGAS. *Studies in Philosophy and Psychology* (by former students of Charles Garman): G. BOS. Della Valle, *La psicogenesi della coscienza:* J. SEGOND. Elie Blanc, *Dictionnaire de philosophie ancienne, moderne et contemporaine:* ANDRÉ LALANDE. Tönnies, *Philosophische Terminologie in Psychologisch-Soziologischer Ansicht:* LALANDE. Grasset, *Demifous et demiresponsables:* G. L. DUPRAT. Moutin, *Le magnétisme humain:* DUPRAT. Masselon, *La mélancholie:* PH. CHASLIN. Francillon, *Essai sur la puberté chez la femme:* CHASLIN. Blondel, *Les automutilateurs:* H. WALLON. Senet, *Patologia del instinto de conservacion:* F. PÉRÈS. *Revue des périodiques étrangers.*

REVUE DE MÉTAPHYSIQUE ET DE MORALE. March, 1907. *Comment se pose le problème de Dieu* (pp. 129–170): E. LE ROY. – The proofs derived from the physical world for the most part are traced to

the assumption that a cause which is not a particular thing in the world must be another thing outside it, whereas there remains the possibility that it is a relation between those things. Those derived from the moral world may be classed as aspirations. The ontological proofs proper ignore the possibility that an idea may be self-contradictory. A constructive paper is to follow. *Note sur le problème du mal* (pp. 171–185): G. REMACLE. – Evil has existence without right to it, and so presupposes a free giver, himself without evil. We can not imitate God by creating evil, for we can only deposit what we have. *Sur l'introduction logique à la théorie des fonctions* (pp. 186–216): M. WINTER. – The logic of mathematics can not aid, apparently, in many fields of mathematics. The confidence of its exponents is misleading. *Arthur Hannequin et son œuvre* (pp. 217–255): J. GROSJEAN. – A detailed account of Hannequin's opinions regarding the history of philosophy and the logic of the sciences. His lovable personality and untimely death. *Le syndicalisme révolutionnaire* (pp. 256–272): F. CHALLAYE. – The second and closing criticism of the theory of world-wide industrial cooperation, directed largely to a defense of national life. *Livres nouveaux:* J. Delvolvé, *Religion, critique et philosophie positive chez Pierre Bayle.* J. Lapponi, *L'hypnotisme et le spiritisme.* J. M. Baldwin, *Thought and Things.* Vol. I. *Revues et périodiques.*

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NOTES AND NEWS

THE *New York Medical Journal* for August 3 writes as follows on the morbid anatomy of mental confusion: "Cases of confusional insanity are beginning to be recognized by the French as distinct from the group of primary, organic dementias. In this they are following the lines laid down by Kraeplin some fifteen years ago. Recent investigations appear to demonstrate a certain relation existing between the disturbance of intellection present in these patients and certain changes in the cells of the cerebral cortex, and, less directly, but more constantly, certain morbid

conditions, notably pus collections or chronic inflammatory foci, in remote regions of the body, especially those affecting the pelvic organs. In patients suffering with light forms of mental confusion, a distinction can and should be made between the fundamental and the accessory manifestations of the mental disorder. Prominent among the fundamental manifestations are the disturbances of the perceptive faculties. These patients are in a state of uncertainty and doubt; they seem lost and undecided where to go. Hence arises the failure in orientation in time and space which is so characteristic of mental confusion. From it also arises the abulia, or deficient will power, which causes the slowness of movement and indecision. Among the accessory manifestations are occasional delirious phenomena. There may be also temporary exaltation, but more frequently depressive ideas prevail. Hallucinations are rare, but delusions are not infrequent. . . . Two pathological factors may be recognized in the class of cases under consideration. One is constant, and this is the presence of toxic elements in the organism; the other is accessory, and consists in the local changes in the cerebral cortex or, more specifically, a local swelling of cortical cells, the projection of the nuclei to the periphery, and the disappearance of chromatin granules (chromatolysis)."

In his 'The Mind and the Brain,' Professor Binet writes as follows on the immediate objects of consciousness: "I believe it has required a long series of accepted observations for us to have arrived at this idea, now so natural in appearance, that the modifications produced in our nervous system are the only states of which we can have a direct consciousness." This statement called forth from the *Athenæum,* in a review of the book in its issue of August 3, the following comment: "Coming from a psychologist, a statement so clearly untrue to the facts can only make one reflect that on this question of external perception most of the really hopeless errors were committed by mere philosophers before the days of psychologic science, and that we ought not to be asked to believe in them all over again because psychologists are falling into the old traps. This particular 'idea' is only a confusion. The last things of which we have a direct consciousness are the modifications produced in our nervous system. The modifications are there, and without them we should not be conscious of the object—that is a very different story."

We quote the following from Sir David Gill's address before the British Association: "By patient, long-continued labor in the minute sifting of numerical results, the grand discovery has been made that a great part of space, so far as we have visible knowledge of it, is occupied by two majestic streams of stars traveling in opposite directions. Accurate and minute measurement has given us some certain knowledge as to the distances of the stars within a certain limited portion of space, and in the crytogram of their spectra has been deciphered the amazing truth that the stars of both streams are alike in design, alike in chemical constitution, and alike in process of development."